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$$\frac{A(x^2) - xB(x^2)}{A(x^2) + xB(x^2)} = r^{2x}; \text{ whence } \frac{A(x^2)}{xB(x^2)} = \frac{1+r^{2x}}{1-r^{2x}} = -\frac{r^x+r^{-x}}{r^x-r^{-x}};$$

$$\text{or, } \frac{A(x^2)}{B(x^2)} = -\frac{r^x+r^{-x}}{(1/x)(r^x-r^{-x})}.$$

$\therefore A(x^2) = (r^x+r^{-x})\phi(x^2), B(x^2) = -\frac{1}{x}(r^x-r^{-x})\phi(x^2)$, where $\phi(x^2)$ is any function of x^2 .

$$\therefore f(x) = \frac{2}{r^x}\phi(x^2).$$

II. Solution by S. LEFSCHETZ, Ph. D., The University of Nebraska.

The given functional equation can be written:

$$f(-x)r^{-x} = f(x)r^x.$$

Hence $f(x)r^x = \phi(x)$, where ϕ is any even function of x .

$$\therefore f(x) = \frac{\phi(x)}{r^x}.$$

$$\text{Ex. } \phi(x) = \sum_0^\infty m A_m \cos mx; \phi(x) = \psi(x^2), \text{ etc.}$$

Also solved by A. H. Holmes and J. Scheffer.

369. Proposed by WILLIAM HOOVER, Ph. D., Athens, Ohio.

If $f(m) = (1+x)^m$, and $f(n) = (1+x)^n$, why not obviously $f(m)f(n) = (1+x)^{m+n} = f(m+n)$?

Solution by J. SCHEFFER, A. M., Hagerstown, Maryland.

The proof given of $f(m)f(n) = f(m+n)$ is certainly incontestable; but it may also be proved directly thus: Differentiating with reference to m and n separately, we have

$$f(n)f'(m) = f'(m+n), \quad f'(n)f(m) = f'(m+n).$$

$$\therefore f(n)f'(m) = f'(n)f(m); \therefore \frac{f'(m)}{f(m)} = \text{a constant} = a \text{ (say)}. \\ \therefore f(m) = a^m.$$

Solutions of 367 were received from A. M. Harding, Elmer Schuyler, S. Lefschetz, and the Proposer.